EMBEDDED LINUX SYSTEMS IN AGRICULTURE

BY

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Introduction

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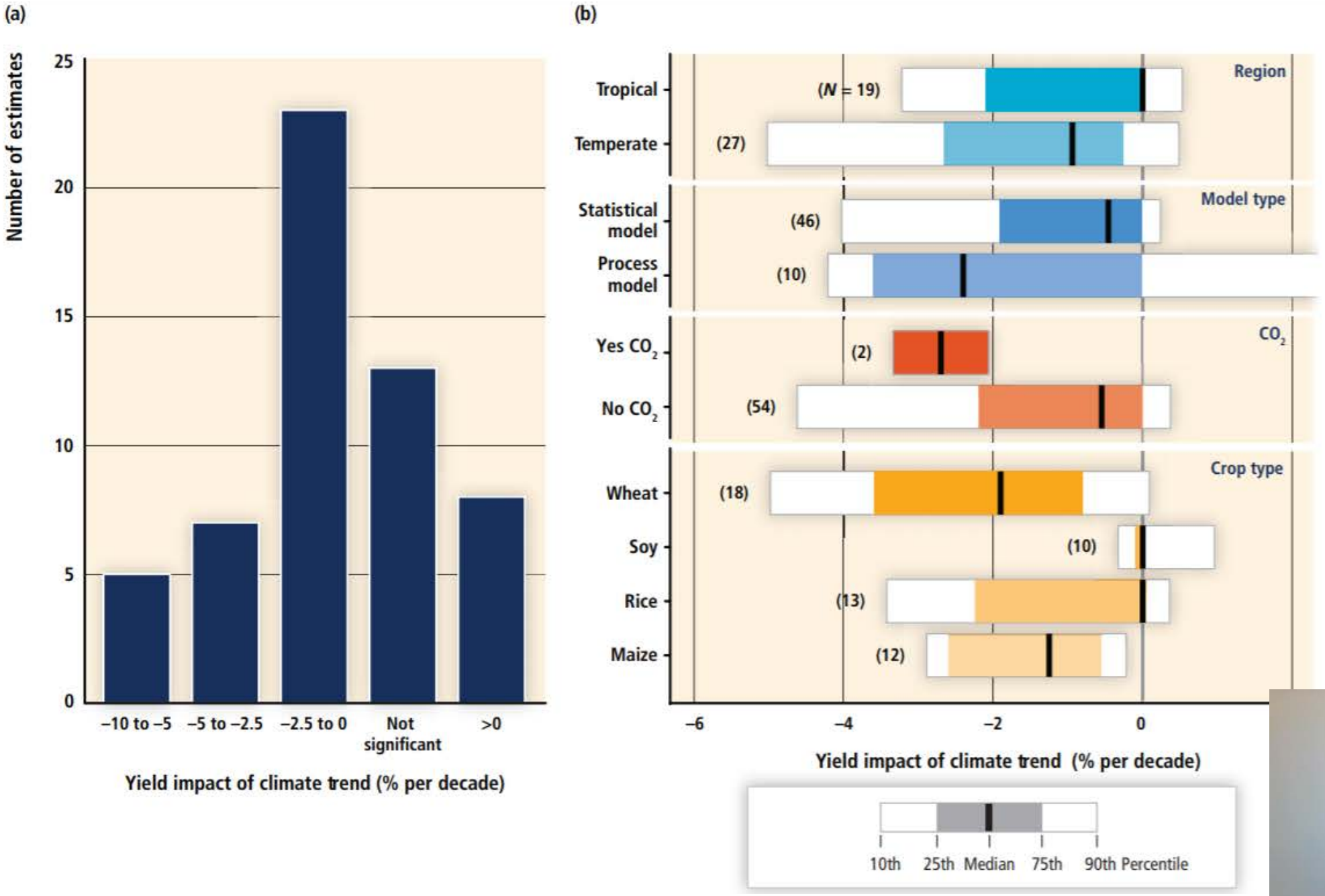
Preamble

The world is struggling with global worming that has led to climate change. Many organizations are trying to find solutions to these challenges and are really struggling in finding a lasting solution.

There has been lobbying from developing countries targeting climate justice and that can help however the solution that needs to be advance with urgency is food security.

With this in mind I thought of how we can utilize technology in the farming and food production sector to minimize wastage, improve farm yields and have adequate information prior to planting and post-harvest.

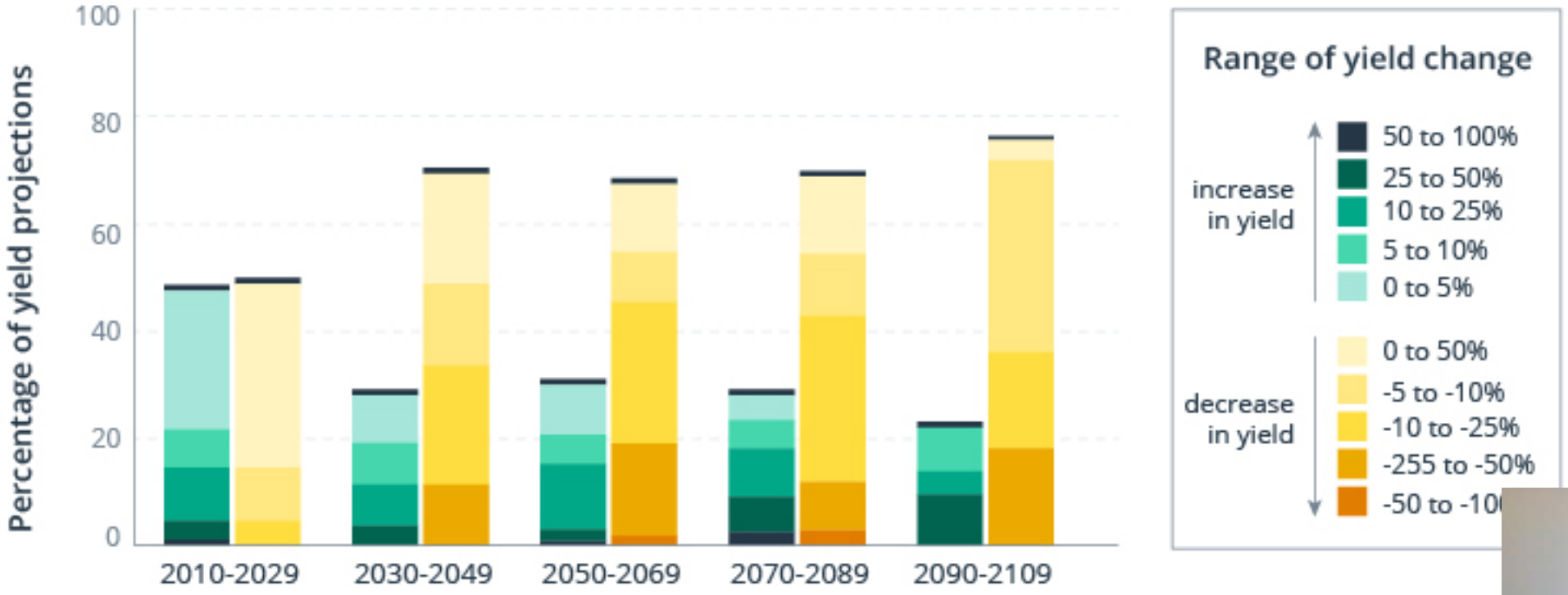
With IoT and Linux embedded systems we can solve these challenges.


(a)
Number of estimates
25
20
15
10
5
0
–10 to –5
–5 to –2.5
–2.5 to 0
Not significant
>0
Yield impact of climate trend (% per decade)
(b)
Region
Tropical
(N = 19)
Temperate
(27)
Model type
Statistical model
(46)
Process model
(10)
CO2
Yes CO2
(2)
No CO2
(54)
Crop type
Wheat
(18)
Soy
(10)
Rice
(13)
Maize
(12)
–6
–4
–2
0
Yield impact of climate trend (% per decade)
10th
25th
Median
75th
90th Percentile

Problem Statement

There has been a huge growth in the use of drones in agricultural activities in the world in the recent past, these drones are usually mounted with sensors and containers to hold fluid pesticides to spray on crops in farms

Impact of climate change on agriculture

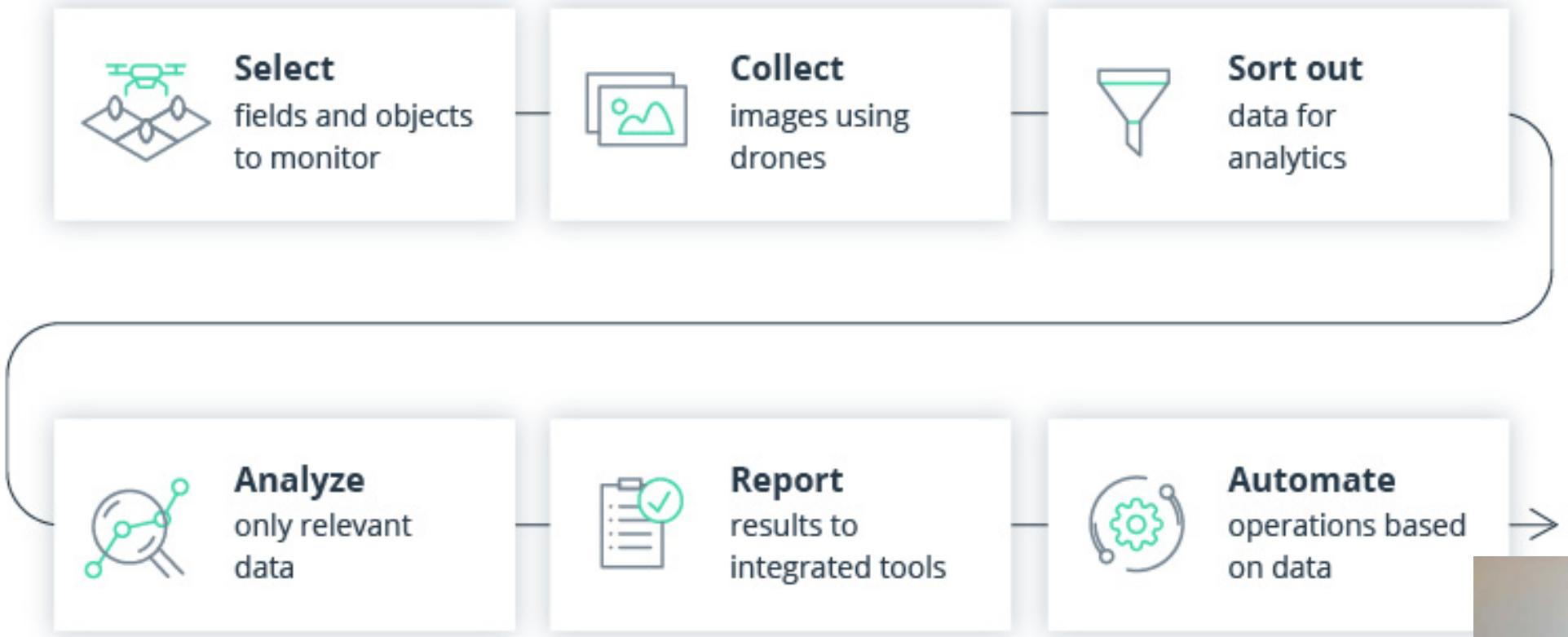


From Future learn Impact of climate change on agriculture

With Linux embedded systems we can utilize every aspect of technology to uncover the true potential of technology in solving our crop farming problems. Just like smart housing, I believe we can use these embedded technologies to do the following:

1. Collect crop data
2. Analysis of collected data
3. Crop management
4. Soil analysis from crop data
5. Seasons utilization
6. Proper timing for planting time. Amongst others.

Summary of Use of drone in data collection

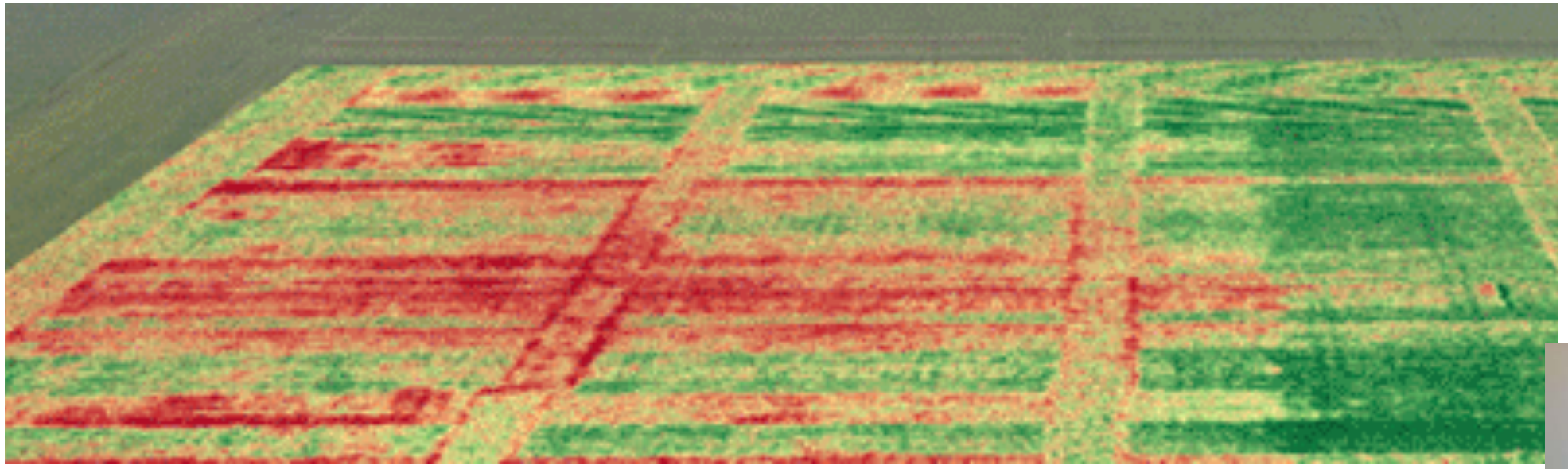


Collecting crop data

From the use of drones, we can get crop progress, pests on the plants, among other factors that can be collected by using sensors and other essential tech. Interconnectivity that allows the drones to intercommunicate and share essential data plus uploading the data to the cloud for future reference and analysis. The forms of data that can be collected from overhead drones like Geo positioning of the crops within a vast area of land

The data can utilize the nature of plants since every living thing has flow of electrons and essential charges that can be used to see the challenges that the plant has.

From botanical knowledge and skills of other experts, we can leverage on these to improve plant growth and the needs of the plants



Analysis of collected data

Data is meaningless when not interpreted or synthesized to facilitate progress and enhancement of smart crop farming. Powerful systems are needed to synthesize such data since the data is voluminous and need proper analysis for use in the field.

We can craft an operating system that has the ability to do such processing and tools that allow users input the parameters to the specific needs of subject being studied.

With the current cloud-based data collected, the essential services and seed manufacturers can improve on the seeds and have a reliable database to inform the farmers on the essential needs of their geographical areas

Crop management

For any famer to get high yields or any haves in that matter, the management process need to be properly handled. Crop management entails all farming needs starting from

planting,

weeding,

Top dressing,

Pest control,

Fumigation and

Harvesting

Precise mapping

Soil analysis from crop data

In life most things are interrelated, plants absorb mineral substances from the soils and grow from them, this can help us use plant data in getting the nutrient deficiencies in the soils and hence the need for specific nutrient additives to the soils.

From the needs of the plats we can go and improve the soils and in turn enhance the production.

We can improve soil fertility by either using organic manure, or go for manufactured fertilizers

Seasons utilization

Most of agricultural produce are usually season and altitude based, a failure in getting the right time to plant may cost a farmer a good fortune both large and small scale farmers. This implies that its paramount to always know the right time to do farm preparation and planting without putting this in mind the losses are usually immense.

From the embedded systems put on the drones for farming, heat signatures as well as the wind flow patterns can be studied to enhance farming by having a prediction on the climatic conditions of the area.

Proper timing for planting time. Amongst others.

With proper season prediction, we can do targeted and properly planned planning since everything can be prepared before time. Avoiding knee jerk reaction and reactive planning, we can do many things and attain very good results in crop farming.

From planting time, the data collected of the plants and from our cloud data, we can determine the right crops to plant that may help in fixation of other overutilized minerals. This will help us utilize natural resources and also improve on the environment hence solving two issues (Food security and global change) with a single bullet

Why Linux Embedded Systems

- Technology runs on Linux and its' opensource nature it gives us the ability to improve and enhance the operating system to fit the environments that these technologies will be deployed to.
- Secondly the nature of Linux Operating systems being simple to install and its light weight nature makes it the most viable option to be used in this project.

Benefits of embedded systems

- Real-time system

- Less power consumption

- Compactly Designed

- Cost-Sensitive

- They have multi-versatile use.

Thanks for your time

Sources

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4. Drones for agriculture, 2018, Food and Agriculture Organization of the United Nations and International Telecommunication Union
5. Linux Embedded System Resources https://www.evelta.com/blog/linux-embedded-system-resources/